PROGRIS RIPORT 11

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010115

itehu:~kotani/glast/txt/010115.kotani2.riport11

1 Have Done

- Made the L3T accept most 300-GeV photons (and 300-GeV electrons, too).
- Found that the efficacy of the DOCA logic is difficult to evaluate.

2 L3T with a LoCal bypass

In Riport 10.5, it was shown that the L3T cuts many 300 GeV photons, which we want. The L3T is modified to accept them as shown in Table 1. The new L3T with a LoCAL bypass accepts most of 300 GeV photons, while the acceptance ratio at 1 GeV is not affected at all. The acceptance ratios are shown in Table 2. With the current filter set, 300 GeV photons outnumber 1 GeV photons! Some other bypasses have been tested and proved to give similar results.

But Table 3 tells us not to be too optimistic. The new L3T accepts many 300 GeV electrons, too. So it goes. I understand that the current filter set was designed to cut protons with energies less than 300 GeV, and not optimized to cut 300 GeV electrons. We must develop a special filter set to cut high-energy electrons and apply it to events with the LoCAL bit. The special filter set is considered to cut high-energy photons, too. It is not known whether the acceptance ratio at 300 GeV is more than 85 % of that at 1 GeV until the filter set is developed.

3 Backsplash

In Riport 10.5, i misunderstood the definition of the parameter Veto_Hit1_X etc. and thus the Riport is misleading. Please don't believe Fig. 3-6 in Riport 10.5. The sampling of the backsplashes is biased. For each event, GLASTSIM outputs the 6 lowest-z hit positions of particles. For example, when an incident particle produces 11 daughter particles and each of them hits a tile, GLASTSIM picks up 6 hits on the bottom rows and write the positions to Veto_Hit1_X parameter etc., ignoring the 5 hits on the top tiles. So the concentration of the points in the bottom in Fig. 5 and 6 may be a fake structure. It is difficult to plot backsplashes without a sampling bias with the current code. New parameters, such as the position of the hit by the daughter particle with the highest energy, are needed.

Table 1: L3T

	Definition
Old	No_Tracks > 0 && Veto_DOCA > 25
New	(No_Tracks > 0 && Veto_DOCA > 25) || LoCAL LoCAL: 1 log above threshold

Table 2: New L3T applied to photons
The column of 1 GeV γ is exactly same as that in Riport 10.5. This is not a cut-and-paste error.

	300 GeV γ		1 GeV γ	
Generated	1	6000	1	5000
L1T	$(5.888 \pm 0.099) \times 10^{-1}$	3533	$(5.72 \pm 0.11) \times 10^{-1}$	2862
L2T	$(5.228 \pm 0.093) \times 10^{-1}$	3137	$(4.270 \pm 0.092) \times 10^{-1}$	2135
New L3T	$(4.303 \pm 0.085) \times 10^{-1}$	2582	$(3.068 \pm 0.078) \times 10^{-1}$	1534
New DOCA	$(4.115 \pm 0.083) \times 10^{-1}$	2469	$(2.964 \pm 0.077) \times 10^{-1}$	1482
Hit Pattern	$(4.083 \pm 0.082) \times 10^{-1}$	2450	$(2.780 \pm 0.075) \times 10^{-1}$	1390
CAL Info	$(2.937 \pm 0.070) \times 10^{-1}$	1762	$(2.734 \pm 0.074) \times 10^{-1}$	1367
Track Quality	$(2.512 \pm 0.065) \times 10^{-1}$	1507	$(2.116 \pm 0.065) \times 10^{-1}$	1058
S/C Induced Event Cuts 0	$(2.488 \pm 0.064) \times 10^{-1}$	1493	$(2.044 \pm 0.064) \times 10^{-1}$	1022
1	$(2.492 \pm 0.064) \times 10^{-1}$	1495	$(2.018 \pm 0.064) \times 10^{-1}$	1009
2	$(2.490 \pm 0.064) \times 10^{-1}$	1494	$(1.950 \pm 0.062) \times 10^{-1}$	975
3	$(2.490 \pm 0.064) \times 10^{-1}$	1494	$(1.950 \pm 0.062) \times 10^{-1}$	975

Table 3: The new L3T applied to electrons

	300 GeV e^-	
Generated	1	8000
L1T	$(3.451 \pm 0.066) \times 10^{-1}$	2761
L2T	$(2.311 \pm 0.054) \times 10^{-1}$	1849
L3T	$(1.856 \pm 0.048) \times 10^{-1}$	1485
New DOCA	$(1.737 \pm 0.047) \times 10^{-1}$	1390
Hit Pattern	$(1.737 \pm 0.047) \times 10^{-1}$	1390
CAL Info	$(9.10 \pm 0.34) \times 10^{-2}$	728
Track Quality	$(8.25 \pm 0.32) \times 10^{-2}$	660
S/C Induced Event Cuts 0	$(8.25 \pm 0.32) \times 10^{-2}$	660
1	$(8.25 \pm 0.32) \times 10^{-2}$	660
2	$(8.25 \pm 0.32) \times 10^{-2}$	660
3	$(8.25 \pm 0.32) \times 10^{-2}$	660

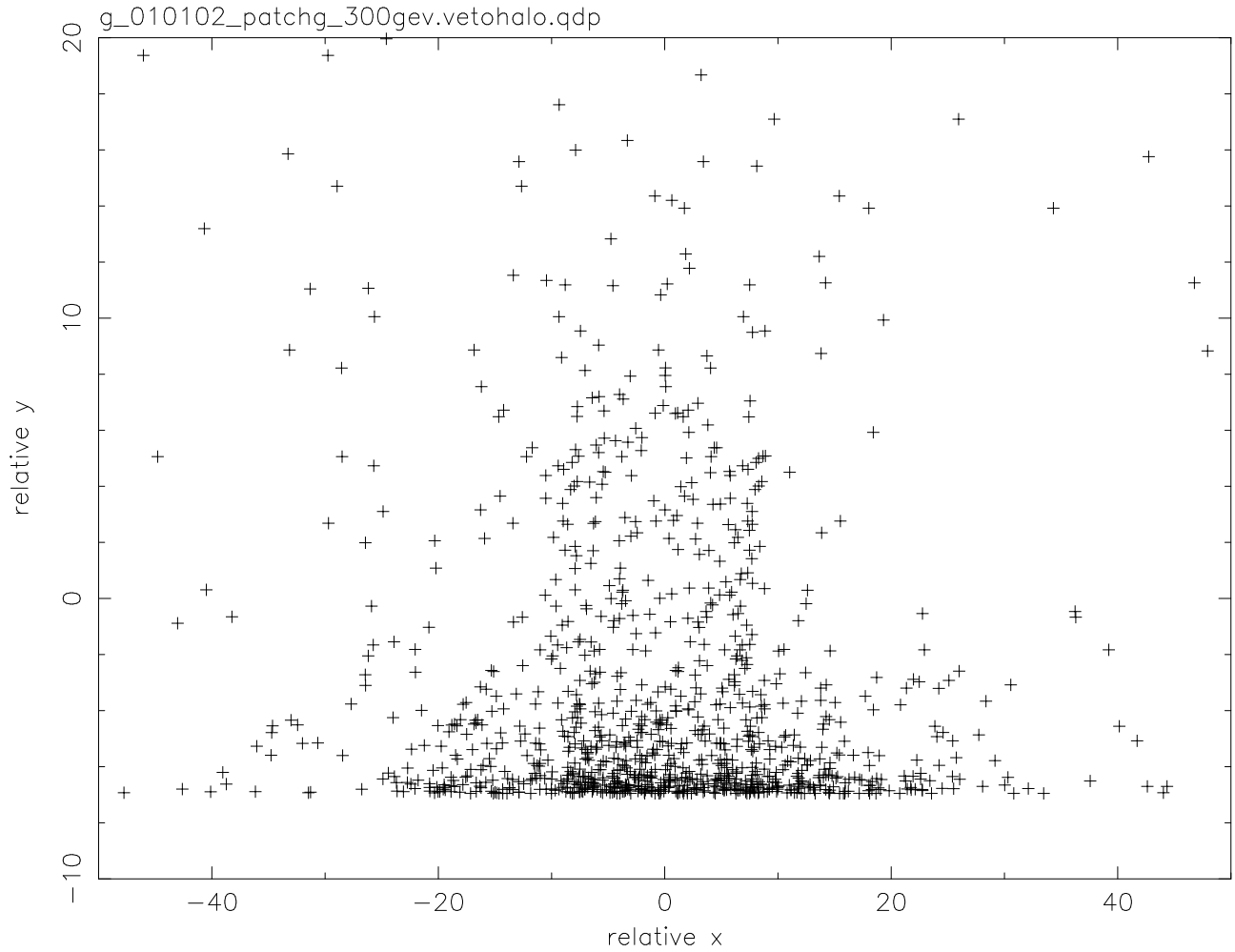

Figure 1: Backsplashes of 300 GeV photons around lit tile
The center of the tile is at the origin. The width and the height of the tile is 16.3 and 15, respectively. Sorry, the code used for this plot might still have a bug.

Backsplashes around each lit tile is shown in Fig. 1. Hoping that the current code outputs most of the hits on the lower tiles, only tiles in the 4th row are used for this plot. For example, when the 8th tile in the 4th row in the west side is lit and Veto_DOCA_S4 > 25, i pick up hits on the west side and plot the relative position to the tile. It should be noted that all the hits including the ones not related to the lit tile are plotted in the figure. It is impossible to plot only the hit used in the DOCA calculation, because there is no hit used in the DOCA calculation. DOCA is calculated from a reconstructed track, not from a real track.

So i'm confused. What's the problem? When does DOCA have a wrong value and what kind of problem does it cause?

To Do

- Can i write another riport before leaving?